

# IB Math HL Y1

## Atmospheric CO<sub>2</sub> Mini-Project

Name \_\_\_\_\_ Date \_\_\_\_\_

This project is due on Tuesday, November 11, and is worth 20 points. It must be submitted to turnitin.com by 8 am, and an (identical) hard copy is due at the start of class the same day.

The turnitin info is:

- Class name: IB Math HL Y1
- Class ID: 2410034
- Enrollment password: mathprojects

The project is adapted from *Precalculus with Limits*, Larson, Hostetler, and Edwards, 2<sup>nd</sup> edition, Houghton Mifflin, 1997.

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Since 1958, the Mauna Loa Climate Observatory in Hawaii has been collecting data on the level of carbon dioxide (CO<sub>2</sub>) in the earth's atmosphere. The table shows the average readings at 5-year intervals starting in January 1959. The readings measure carbon dioxide concentration in parts per million.

Year	1959	1964	1969	1974	1979	1984	1989	1994
CO <sub>2</sub> level	315.4	319.4	323.8	329.2	336.1	343.5	352.6	358.3

1. Make a scatterplot of the data, then choose a linear, quadratic or exponential model for the data. Explain your choice.
2. As noted, the data give measured CO<sub>2</sub> levels in January of the given years, but CO<sub>2</sub> levels also vary throughout the year.
  - In April, the average reading is about 2.5 parts per million higher than the average reading in January.
  - In July, the average reading is about the same as in January.
  - In October, the average reading is about 2.5 parts per million lower than the average reading in January.
  - a) What physical factors might contribute to the fluctuation of CO<sub>2</sub> levels during the year?
  - b) Revise your model to take this fluctuation into account.
3. Make a graph of the revised model over the entire span of the data, and also over a particular two-year stretch of time. Is the revised model periodic?
4. Use the revised model to predict the level of CO<sub>2</sub> in the atmosphere in
  - a) 2000
  - b) 2020

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The rubric for this project is copied on the back of the sheet.